

REMARKS

In the Office Action dated May 15, 2007, claims 1-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Foley et al. in view of Kienzle, III et al.

In response to Applicants' previous arguments regarding the Kienzle, III et al. reference, the Examiner stated that Kienzle, III et al. discloses a clamp (i.e., a medical instrument) having a toothed jaw for rigidly affixing the clamp to a bone on which surgery is being performed. The site of the surgery is determined directly from the reference frame created by the clamp upon being affixed to the bone. The Examiner stated that in Kienzle, III et al., as the bone moves, the site of the surgery is translated/rotated based on the tracking of the medical instrument. The Examiner cited column 19, line 39 through column 20, line 65 of the Kienzle, III et al. reference for this purpose.

With regard to Applicants' previous arguments that none of the references discloses segmentation procedure, the Examiner stated that the Foley et al. reference provides such a procedure as understood in its broadest reasonable interpretation. The Examiner stated that a segmentation process does not necessarily isolate one group from another in an image so as to allow sections of an image to move independently from one another. The Examiner stated a segmentation process allows identification of objects above background noise using image-processing methods, and the Examiner stated such a procedure is disclosed in the Foley et al. reference.

The above rejection, and these statements of the Examiner, are respectfully traversed for the following reasons.

First, regarding the scope and meaning of the term “segmentation procedure,” Applicants submit that it is beyond question that this term has a well-defined and well-understood meaning to those of ordinary skill in the field of image processing. Applicants are entitled to use that term in accordance with this well-understood and documented meaning. The fact that a citation can be located that uses the term in an aberrational manner does not undermine the fact that those of ordinary skill in the field of image processing do not use that term, or commonly understand that term, in a different way. The fact that segmentation had to be defined in detail in the website cited by the Examiner is evidence that the authors of the text in that website were not using the term in its conventional manner, otherwise such an explanation would not have been necessary.

Those of ordinary skill in the field of image processing clearly and unambiguously understand a segmentation procedure to mean separating, by image processing techniques, an object, item or portion within an overall display in a manner that allows the separated object, item or portion to be moved independently of the remainder of the overall display. Although Applicants believe this meaning is inherent in the use of the term “segmentation procedure” by itself, each of independent claims 1 and 8 has been editorially amended to make this meaning explicit in the claim language.

This is important to the method and apparatus disclosed and claimed in the present application because, since the visualization of the bone fragment has been segmented from the remainder of the displayed body image, the present Applicants have had the insight to realize that, since the medical instrument is in contact with, or in a known spatial relationship relative to, the bone fragment, as long as the position

of the medical instrument can be known (by means of the navigation system), it is not necessary to continuously obtain updated information as to the position of the bone fragment itself. Since the position data for the medical instrument are known, the segmented visualization of the bone fragment can be repositioned in the display of the body region by obtaining modified position data directly and solely from the medical instrument position data. This modified position data for the bone fragment is then used in the display of the body region to allow the segmented visualization to be repositioned.

This is in contrast to the procedure disclosed in the Foley et al. reference, wherein internal body parts, which may be bone fragments, must be identified and monitored before and during a surgical procedure, in order to identify their location within the body in the visual display. For this purpose, Foley et al., as explained at column 5, lines 51-52, update or modify the position of the bone fragments in the displayed image by identifying the location of a number of reference points of each skeletal element in so-called "procedure space." A localizer 108 then identifies the location and provides this information to a processor that operates on so-called pre-procedural data, so that this data can be modified to form a dataset wherein the displacement or movement of the bone fragment is tracked.

Therefore, in the Foley et al. reference, it is necessary to track the actual position of a bone fragment, or the position thereof relative to surrounding reference points, and this positional information regarding the bone fragment itself is then used to update the data. This is exactly the type of procedure that is described in the introductory portion of the present specification, which the method and apparatus disclosed in the application are intended to avoid.

As noted above, the present Applicants have had the insight to realize that is a segmentation procedure is undertaken that allows the bone fragment to be moved or repositioned separately from the remainder of the displayed image, it is not necessary to track the position of the bone fragment itself in any manner. The position data that is already available regarding the position of the surgical instrument can be used to generate modified position data that indicate the position of the bone fragment and the bone fragment can then be repositioned in the display of the body region according to this modified position data.

In Foley et al., since the position of the bone fragment itself must be tracked, this is the equivalent of generating a number of successive “snapshots” of the body region in which the bone fragments are moving, and the most recent “snapshot” is then displayed as a manner of tracking movement. Therefore, the images that are successively displayed in full in Foley et al. are not the same image, with the bone fragment moving therein with respect to background contents in the image, but are actually new images that are re-created successively in order to track the movement of the bone fragment. This is not the same as a segmentation procedure as set forth in the claims of the present application, wherein the bone fragment actually moves within the image of the body region. This is made clear in the claimed subject matter because the image of the body region is always referred to, after the first mention thereof, as “*said* image of the body region,” thereby making clear that one and only one image of the body region is generated, and the segmented visualization of the bone fragment is then repositioned within that image of the body region.

The Kienzle, III et al. reference does not provide any different teachings with regard to the teachings of Foley et al. discussed above. The Kienzle, III et al. reference also requires the use of a tracking device attached to a moving body part. This tracking device can be tracked by a localizing device, such as an optical localizer. This is the same as the generation of the so-called "reference frame" in the Foley et al. reference.

Therefore, the fact that neither Foley et al. nor Kienzle, III et al. make use of a true segmentation procedure necessitates the type of tracking and updating of "snapshot" image as described above. It is only by the use of a true segmentation procedure, combined with the insight that position data of the medical instrument that interacts with the bone fragment is already available, that the present inventors have been able to avoid the necessity of individually tracking the position of bone fragments themselves, as disclosed in Foley et al. and Kienzle, III et al.

Therefore, even if the Foley et al. reference were modified in accordance with the teachings of Kienzle, III et al., the subject matter of independent claims 1 and 8 still would not result. Those claims, and the claims respectively depending therefrom, therefore would not have been obvious to a person of ordinary skill in the field of medical image processing under the provisions of 35 U.S.C. §103(a) based on the teachings of those references.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

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